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CHINO HILLS

URBAN WATER MANAGEMENT PLAN

December 2005

Prepared For:

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Acknowledgements

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Abbreviations and Acronyms

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Act	California Urban Water Management Planning Act
AF	Acre-feet
AFY	Acre-feet per year
BMP	Best Management Practice
CCWRF	Carbon Canyon Wastewater Reclamation Facility
CDA	Chino Basin Desalter Authority
CIMIS	California Irrigation Management Information System
City	City of Chino Hills
CSD	Community Service District
CUWCC	California Urban Water Conservation Council
DHS	Department of Health Services
DWR	Department of Water Resources
DYY	Dry Year Yield Program
E_{to}	Evapotranspiration
FY	Fiscal year
GIS	Geographical Information System
IEUA	Inland Empire Utilities Agency
Master Plan	City of Chino Hills Water, Recycled Water, and Wastewater Sewer Master Plan
MCL	Maximum contaminant level
MGD	Million gallons per day
Mg/L	milligrams per liter
MOU	Memorandum of Understanding
MVWD	Monte Vista Water District
MWD	Metropolitan Water District
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollution Discharge Elimination System
OBMP	Optimum Basin Management Plan
OCWD	Orange County Water District
ppb	parts per billion
RO	Reverse osmosis
RWQCB	Regional Water Quality Control Board
SARWQCB	Santa Ana Regional Water Quality Control Board
SAWPA	Santa Ana Watershed Project Authority
SB	Senate bill
SCAG	Southern California Association of Governments
SWP	State Water Project
TDS	Total dissolved solids
UWMP	Urban Water Management Plan
WFA	Water Facilities Authority

Chapter 1
Service Area

1.1 Introduction

This 2005 update of the City of Chino Hills' (City) Urban Water Management Plan (UWMP) is prepared in accordance with the California Urban Water Management Planning Act (Act) of 1983 and its amendments. The text of the Act is contained in Appendix A. The City's 2005 UWMP is substantially revised from the 2000 UWMP, updated to reflect more recent and comprehensive analyses of supply and demand for the City. Appendix B contains the City's completed Department of Water Resources (DWR) UWMP checklist, with references to the sections and page numbers included in the 2005 UWMP.

1.2 City History and Overview

The City is located in the southwest corner of San Bernardino County and adjacent to three counties. A small portion of the southern and eastern City boundaries coincides with the Riverside County boundary. The southwestern City boundary is the Orange County line and the western and northern boundaries are defined by the Los Angeles County line. The eastern City boundary meanders along State Highway 71. State Highway 142, also known as Carbon Canyon Road, runs through the northern half of the City. The surrounding cities include Pomona to the north, Chino to the east, Brea and Yorba Linda to the southwest, and the Diamond Bar to the northwest. **Figure 1-1** presents the vicinity and location maps for the City.

The City was incorporated on December 1, 1991. The City boundaries encompass approximately 29,440 acres (46 square miles). A significant portion of southern portion of the City, approximately 6,915 acres (10.8 square miles), is occupied by the Chino Hills State Park. The terrain of the City consists of rolling hills and valleys, with elevations ranging from about 410 feet to approximately 1,780 feet above sea level.

The vast majority of developable land within the City is zoned residential. Residential development generally emanates from along the City's significant transportation corridors: Carbon Canyon Road, Butterfield Ranch Road, Peyton Drive and Grand Avenue. According to the 1990 census, almost 85 percent of the residential units are owner-occupied. Of the limited commercial development, most occurs along the State Highway 71 corridor. Other land uses include agricultural, parks, institutional, and landscaping. There is a significant amount of vacant land zoned as "agricultural/ranches" category. It is anticipated that this land will eventually be estate type residential development with ancillary horse ranch or non-commercial agricultural activity.

1.3 Water Master Plan

A City of *Chino Hills Water, Recycled Water, and Wastewater Sewer Master Plan* (*Master Plan*) is currently being prepared by PBS&J for the City, and will be completed in 2005. This updated *Master Plan* evaluates the City's existing and planned water sources, water and recycled water

Figure 1-1
Chino Hills Service Area

distribution systems, and sewer collection systems with respect to their ability to meet projected demands. In addition, substantial emphasis is placed on developing new Geographical Information System (GIS) mapping and GIS-based hydraulic models to improve the infrastructure planning capabilities of the City.

1.4 Agency Coordination

The City is one of eight members of the Inland Empire Utilities Agency (IEUA), a wholesale water agency. The IEUA member agencies obtain about 50 percent of their water from the Metropolitan Water District (MWD) imported source, and about 50 percent from local wells, local surface water, recycling.

The City has coordinated the preparation of this UWMP with the IEUA, as shown in **Table 1-1**. The City has also reviewed the IEUA's Draft 2005 Urban Water Management Plan and incorporated references herein, where applicable. The preparation of the City's 2005 UWMP in conjunction with the *Master Plan*, has refocused efforts by the City to improve water supply reliability and reduce the need to import water.

Table 1-1
Coordination with Appropriate Agencies

Agency	Participated in UWMP Development	Commented on the draft	Attended public meetings	Contacted for assistance	Received copy of draft	Sent notice of intention to adopt	Not Involved/ No Information
IEUA	x			x	x	x	
Chino Desalter Authority				x	x	x	
Monte Vista Water District				x	x	x	
San Bernardino County						x	

1.5 Service Area Population

With its proximity to the major metropolitan growth areas of Los Angeles, Orange, and Riverside Counties, the City is experiencing rapid growth. The population increased by over 70 percent in a 10-year period from 1990 to 2000. The *Master Plan* projects build-out will occur in 2025. **Table 1-2** shows the population total for 2005, with projections to 2030, based on the City's current population and Southern California Association of Governments (SCAG) forecasts.

The service area population has a median household income of $86,000 (based on 2002 census data) and thus is generally an affluent community. The City is also characterized by a prevalence of single-family residences. Based on the 2000 Census, about 85 percent of households are families, and about 85 percent of housing units are owner-occupied. These demographic factors have influenced water use. Residential water use is about 75 percent of total water use, and is thus the focus of the City's water conservation efforts.

Table 1-2
City of Chino Hills Current and Projected Population

	2005	2010	2015	2020	2025	2030
Service Area Population[1]	77,819	80,126	81,916	83,636	85,284	85,500

[1] Population data for 2005 is from the City of Chino Hills (State Department of Finance - 5/2/05), and population projection for 2025 is based on 2005 SCAG projections for 2030. Interim years are adjusted based on SCAG data and *Master Plan* assumptions.

1.6 Climate

The City is located within the desert climate zone of Southern California. The City receives an average annual rainfall of about 17 inches. Monthly average temperatures range from about 53 to 73 degrees. **Table 1-3** provides monthly average evapotranspiration (E_{to}), rainfall, and temperature in the vicinity of the City, as measured by the California Irrigation Management Information System (CIMIS) and National Oceanic and Atmospheric Administration (NOAA) stations in Pomona. Because the City is located in such a hot and dry climate, swimming pools and irrigated landscapes are prevalent, further establishing the City's dependence on reliable water supplies.

Table 1-3
City of Chino Hills Climate

	Standard Average E_{to}[1] (in.)	Average Precipitation[1] (in.)	Average Temperature[1] (F)
January	1.72	3.97	53.3
February	2.03	3.07	54.9
March	3.37	2.77	56.6
April	4.54	1.20	59.2
May	5.00	0.41	62.9
June	5.80	0.05	67.2
July	6.51	0.04	67.6
August	6.39	0.11	72.7
September	4.69	0.27	70.5
October	3.48	0.40	64.0
November	2.27	1.75	57.1
December	1.71	2.49	52.0
Annual Total/Avg	47.51	16.53	61.9

[1]Data are based on NOAA and CIMIS stations in Pomona.

1.7 Public Participation

In accordance with the Act, the City made the draft 2005 UWMP available for public review at the City's office, and provided draft copies to appropriate stakeholders including San Bernardino County, the IEUA, Chino Desalter Authority, Monte Vista Water District, Carbon Canyon Community Center, McCoy Equestrian Center, and Chino Hills Library. In addition, the City advertised a notice of the public hearing to adopt the UWMP (**Appendix C**). The City held a

public hearing on November 22, 2005 and adopted the 2005 UWMP on that same day. A copy of the resolution is included in **Appendix D**.

Chapter 2
Water Demand

Water consumption within the City is determined by climatic, economic and demographic factors. As previously discussed, the City is predominantly a residential community. Therefore, a majority of the water use is for private residences (which includes residential landscape uses) and community landscape irrigation.

2.1 Historic Water Use

Since the City's inception in 1991, water use has grown along with the City's population and developed land area. In 2003, the City experienced a total potable water demand of approximately 15,000 acre feet per year (AFY) and a total recycled water demand of approximately 1,000 AFY. **Figure 2-1** displays the historic and projected water usage within the City. The City has experienced fluctuations in annual use due to dry and wet years but the general trend has been an increase in annual demand due to expanded development in the City.

Figure 2-1
Historic and Projected Potable Water Demands (Excluding System Losses)

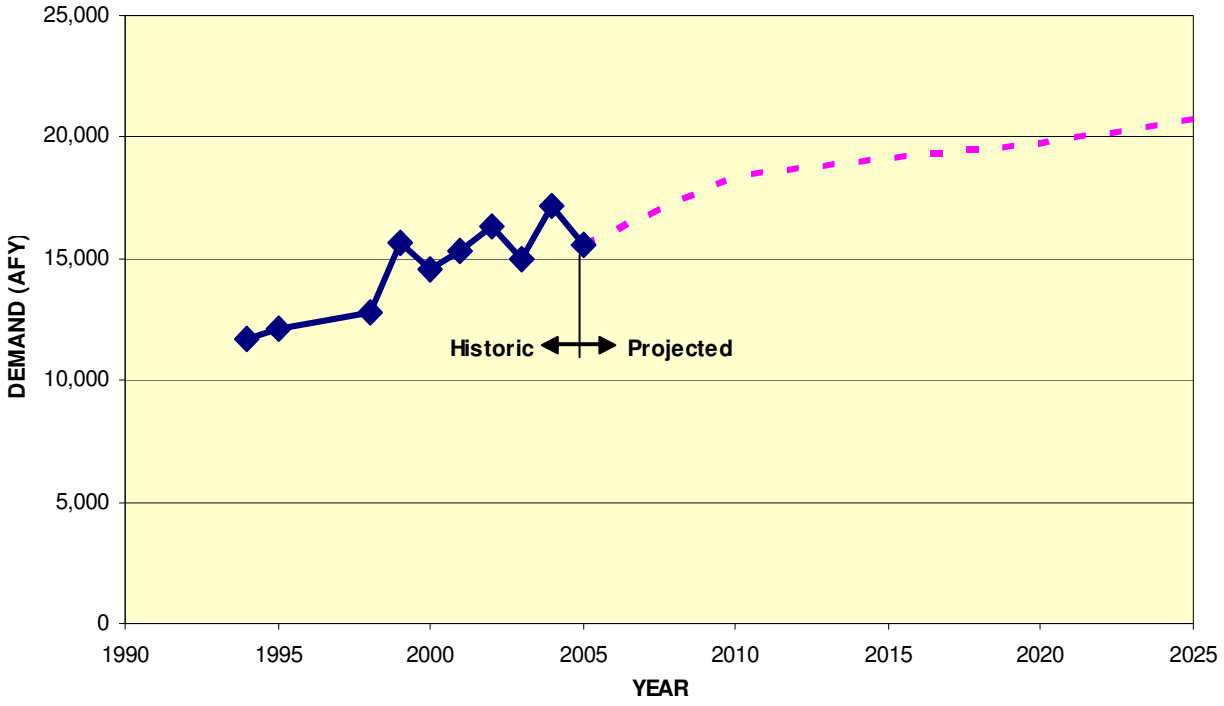
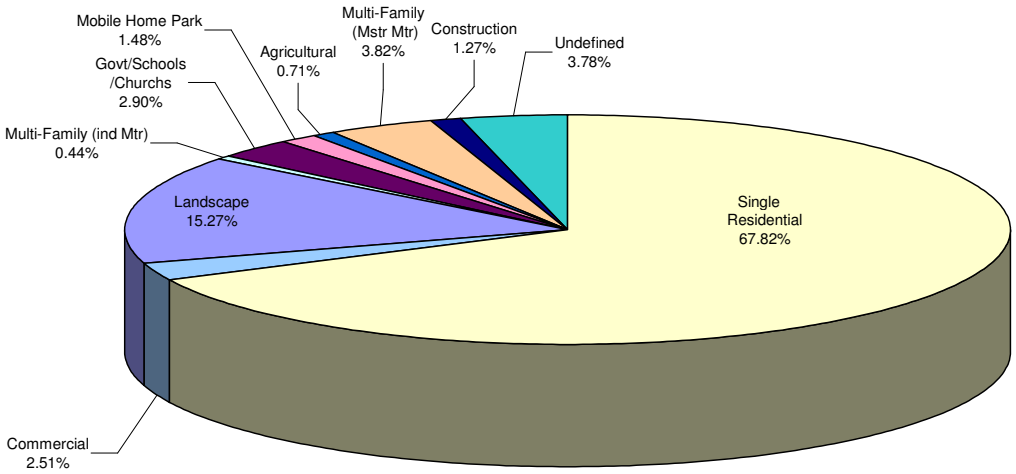


Figure 2-2 displays the breakdown of potable water usage between 2001 and 2003 according to the City's water use categories. Of the approximately 17,100 acres of land available for development within the City (excludes state park, public open space, and streets/other), 14,800 acres (86 percent) are residential, 600 acres (3 percent) are commercial, and 1,700 acres (10 percent) are other land uses.

Figure 2-2
Potable Water Consumption (2001-2003)



2.1.1 Residential Water Use

Within the City, residential water use accounts for approximately 75 percent of potable water use. Approximately half of the currently unoccupied land available for development is zoned for low density residential, and thus the vast majority of future development in the City will be residential (including agricultural/ranches). As such, the City anticipates future increases in water demand to also be dominated by residential demands.

2.1.2 Landscape Irrigation

Landscaping is currently the second highest potable water use following single-family residences; however, the City expects landscaping potable water use to decline as expansion of the recycled water distribution system continues and landscape users are converted from potable to recycled water.

2.1.3 Industrial, Commercial and Institutional Water Use

Commercial and industrial water use accounts for 4 percent of the total potable water use in the City, while institutional water use accounts for 3 percent of the City's total potable water use. This is consistent with the small percentage of the City's land use dedicated to industrial, commercial and institutional uses. The City does not expect increases in industrial, commercial and institutional water uses to be substantial since only a small percentage of land available for development is zoned as industrial, commercial and institutional.

2.1.4 Agricultural Water Use

The nature of agricultural use within the City is limited to supporting existing grazing lands and a small commercial agricultural area in the extreme eastern portion of the City. This use accounts for less than 1 percent of the City's total potable water use, and is expected to decrease even further in future years. Due to the high value of the land within the City for residential development, the City expects land currently used for commercial agriculture to be converted to residential developments, and thus agricultural water use will decrease.

2.2 Projected Water Use

The City's most recent water demand projections are based on the *Master Plan*. The *Master Plan* developed projections in five-year increments over the next 20 years, based on estimates of the status and timing of currently approved development, as well as on estimates of probable future development as zoned in the City's General Plan. The *Master Plan* projects that water demands over the next 20 years will increase along with population and along with development of planned golf courses and parks. The year 2020 was assumed to be the year that build-out conditions would be experienced. **Table 2-1** presents past, existing, and future water use in five-year increments through 2020, categorized by usage type. In the *Master Plan*, the build-out water use (2020 potable water average annual demand) was estimated at approximately 18.3 MGD, a 36 percent increase in demand from year 2003. By year 2020, the residential land use types (rural, low, medium high, and very high residential) are expected to account for approximately 80 percent of the total potable water demand.

Table 2-1
Past, Current, and Projected Water Deliveries (AFY)

Year	Single Family	Multi-Family	Commercial & Industrial[1]	Inst./ Gov.	Landscape	Agriculture[2]	Recycled Water	System Losses[3]	TOTAL
2000[4]	10,555	1,247	742	0	1,222	86	801	1,300	15,953
2005[5]	10,916	1,700	600	450	1,000	86	815	1,200	16,767
2010	13,700	2,500	700	450	990	0	2,900	1,500	22,740
2015	14,600	2,800	725	450	500	0	4,000	1,600	24,675
2020	15,000	3,000	750	450	500	0	4,000	1,700	25,400
2025	15,700	3,300	775	450	500	0	4,000	1,700	26,425
2030	15,700	3,300	775	450	500	0	4,000	1,700	26,425

[1] The City has no industrial water users.

[2]Agricultural water use is based on a single agricultural user, expected to convert to non-agricultural use by 2010.

[3] System losses include water lost to leaks and other unaccounted water (7.4% of total demand for 2000 and 2005 and 7% of total demand for 2010 through 2030). Year 2000 system losses also include approximately 227 AF of uncategorized water accounts.

[4] Year 2000 data was adapted from water data used in the *Master Plan*.

[3] Year 2005 data is extrapolated from water demands incorporated in the *Master Plan,* as well as actual supply totals provided by the City for FY

[5] Projections for 2010 through 2030 are based on assumptions documented in the *Master Plan,* including build-out in 2025. Golf course irrigation is included under Landscape and Recycled Water categories.

Chapter 3
Water Demand Management

The California Urban Water Conservation Council (CUWCC) was formed to assist water retailers in implementing an effective conservation program through Best Management Practices (BMPs). The CUWCC was formed in 1991 through a Memorandum of Understanding (MOU) regarding urban water conservation in California. The MOU included a list of urban BMPs to help define appropriate water conservation measures for urban water agencies. Agencies signing the MOU commit to implementing these BMPs. The CUWCC's list of BMPs is updated periodically and incorporated in the Urban Water Management Planning Act.

The City has initiated membership in the CUWCC in 2005, so no Annual Reports or BMP Coverage Reports are yet available to document the City's compliance with BMPs. Listed in **Table 3-1** are the recently updated BMPs, as outlined by the CUWCC, all of which have been implemented by the City either independently or in cooperation with IEUA.

Table 3-1
BMPs for Urban Water Conservation in California

BMP #	Description
1	Water survey programs for single-family residential and multifamily residential customers
2	Residential plumbing retrofit
3	System water audits, leak detection, and repair
4	Metering with commodity rates for all new connections and retrofit of existing connections
5	Large landscape conservation programs and incentives
6	High-efficiency washing machine rebate program
7	Public information programs
8	School education programs
9	Conservation programs for commercial, industrial, and institutional accounts
10	Wholesale agency programs
11	Conservation pricing
12	Water conservation coordinator
13	Water waste prohibition
14	Residential ultra-low-flush toilet replacement program

3.1 Water Demand Management Measures

The City is committed to water conservation as a method of reducing demands. Resolution No. 96R-52 was passed in 1996, requesting a voluntary reduction in water use by all customers and committing the City to a water conservation plan. A copy of this resolution is provided in **Appendix G**. The following sections describe the City's' specific conservation program and effectiveness in more detail.

BMP No. 1 (Water Survey Programs): Resolution No. 95R-59 was passed in 1995 to conduct single family residential indoor and outdoor water surveys as part of a pilot project with the

Metropolitan Water District. This study was specifically intended to promote water conservation within the City's service area. A copy of this resolution is provided in **Appendix G**.

BMP No. 2 (Residential Plumbing Retrofit): Beginning in 1996, the City offered a water conservation kit to residential customers, to retrofit residences with low flow shower heads and faucet aerators which can reduce the water used in sinks and showers by about 50 percent.

BMP No. 3 (System Water Audits): The City has administered a Landscape Water Audit Program. A large landscape audit program was conducted by IEUA, and it included eight residential properties and two institutional properties in The City. Large landscape surveys have the potential to reduce demands of those users surveyed by 15 percent.

BMP No. 4 (Metering With Commodity Rates): Resolution No. 03R-33 was passed in 2003 to establish commodity rates that promote water conservation through the implementation of a tiered rate structures. A copy of this resolution is provided in **Appendix G**.

BMP No. 5 (Large Landscape Conservation Programs): The City has a centralized irrigation system that saved approximately 142 million gallons in its first year; the centralized irrigation system allows the City to manage landscape irrigation water usage based on rainfall, temperature, humidity, and evaporation.

BMP No. 6 (High-Efficiency Washing Machine Program): Since 2002, in a partnership with other agencies, the City has been offering a high-efficiency washing machine rebate. This program provides $100 for the purchase and installation of a residential high-efficiency washing machine.

BMP No. 7 (Public Information Programs): The City is a member of the Water Education Water Awareness Committee, a coalition of 13 agencies whose mission is to promote the efficient use of water and increase public awareness of the importance of water in Southern California. The City partners with other agencies to conduct water conservation and awareness classes and workshops, and to provide conservation kiosks at local events. Also, refer to BMP No. 8 for a description of the annual Water Conservation Poster Contest.

BMP No. 8 (School Education Programs): The City conducts an annual Water Conservation Poster Contest for students grades K through 12 attending the City schools. The context promotes water awareness among children. Winning posters are then developed into the City water conservation street signs and are placed throughout the community; the signs then become part of the on-going water conservation public information campaign. The City has also administered a National Theatre for Children and Garden in Every School programs to raise water resource awareness among children. The Garden in Every School Program is a pilot program started in 2004-2005 to place a California native garden in elementary schools and train teachers to incorporate garden-based learning in their classrooms.

BMP No. 9 (Conservation Programs for Institutional, Commercial, and Industrial Accounts): Although this category only represents about 5 percent of the City's water demand,

rebate programs are available for ultra-low-flush toilets, pressurized water brooms, and other water saving devices.

BMP No. 10 (Wholesale Agency Programs): The Metropolitan Water District changed their rate structure in 2003 according to a two-tiered system. The Inland Empire Utilities District as a member agency can purchase imported water up to an amount equal to a base allocation, which is Tier I. Any additional purchases will fall into Tier II, which as a significantly higher cost. For the Inland Empire Utilities District, the difference between the cost of Tier II imported water and the cost of implementing conservation measures is the value of conservation to the region. In 2003-2004, IEUA began a program to provide financial assistance to each of its member retail agencies in an effort to support local implementation. IEUA provides an annual grant of $2,000 to each agency for a BMP-related program or project.

BMP No. 11 (Conservation Pricing): IEUA collects revenue for regional conservation programs through an imported water surcharge to agencies, a retail meter charge, a property tax charge, various grants, and interest on Water Fund Reserves.

BMP No. 12 (Water Conservation Coordinator): The City has a Utilities Conservation Specialist to address utility conservation efforts and to represent the City on issues regarding water conservation and recycled water use.

BMP No. 13 (Water Waste Prohibition): Resolution No. 96R-52 requires all City landscape areas to be irrigated without water waste and prohibits large landscape areas from being installed during the peak period of high heat in July through August.

BMP No. 14 (Residential Ultra-Low-Flush Toilet Replacement Program): The City partnered with other member agencies to provide an ultra-low-flush toilet distribution and rebate program.

Swimming Pool Cover Rebate: In partnership with other agencies, the City has provided a swimming pool cover rebate to reduce high evaporation and water loss associated with swimming pools. This program is not expected to be continued because the participation and water savings were less than anticipated to justify the expenses.

3.2 Effectiveness of Conservation Measures

Water conservation is a well-established component of ensuring that there will be a reliable water supply in the future for the City's increasing population. The *Master Plan* found that about one half of the residential water use results from landscape irrigation. Thus conservation efforts will continue to be focused on residential water use and in particular, efficient irrigation practices.

The City is committed to promoting water conservation to reduce the consumption of potable water. In 2002, the City received the League of California Cities Helen Putnam Award for Excellence in Community Development and Public Involvement for its water conservation program. The effectiveness of the conservation program can also be seen by the relatively stable

consumption of potable water over the last five years despite significant population increases. The City is not able to quantify conservation savings attributed to various BMPs, but the implementation schedule for the BMPs is provided in **Table 3-2**. The table also includes the actual numbers of units installed or surveys conducted in FY 2005, where applicable.

Table 3-2
Implementation of Conservation BMPs for Chino Hills

BMP No.	BMP	Implementation					
		2005[1]	2010	2015	2020	2025	2030
1	Residential Surveys	No	Possible	Possible	Possible	Possible	Possible
2	Residential Retrofits	Yes	Yes	Yes	Yes	Yes	Yes
3	System Water Audits	Yes	Yes	Yes	Yes	Yes	Yes
4	Metering with Commodity Rates	Yes	Yes	Yes	Yes	Yes	Yes
5	Large Landscape Conservation Programs	10	Yes	Yes	Yes	Yes	Yes
6	High-Efficiency Washing Machine Rebates	307	Yes	Yes	Yes	Yes	Yes
7	Public Information Programs	Yes	Yes	Yes	Yes	Yes	Yes
8	School Education Programs	Yes	Yes	Yes	Yes	Yes	Yes
9	Conservation for Commercial, Industrial, and Institutional	0	Yes	Yes	Yes	Yes	Yes
10	Wholesale Agency Programs	Yes	Yes	Yes	Yes	Yes	Yes
11	Conservation Pricing	Yes	Yes	Yes	Yes	Yes	Yes
12	Water Conservation Coordinator	Yes	Yes	Yes	Yes	Yes	Yes
13	Water Waste Prohibition	Yes	Yes	Yes	Yes	Yes	Yes
14	ULFT Incentives	79	Yes	Yes	Yes	Yes	Yes
15	Swimming Pool Rebate Program	18	No	No	No	No	No

[1] Note that some programs indicate zero units installed; however, the BMP program is still in place.

Chapter 4
Water Supply

4.1 Overview of Water Sources

The City relies on a variety of sources of water supply to meet demands, and several agencies other than the City are involved. The City works cooperatively with other agencies to achieve water supply reliability for its customers. The City's current portfolio of water supply sources is shown in **Table 4-1**. The table also indicates which agencies are involved and what their roles are, with regard to each listed supply source. Each of the relevant agencies is also briefly described below in more detail, based on the information in the IEUA *2005 Urban Water Management Plan*. **Figure 4-1** shows the relative locations of each supply source provided to the City, as well as the location of the Chino Basin.

Table 4-1
Chino Hills Water Supply Sources and Coordinating Agencies

Supply Source	Description	Agencies Involved							
		IEUA	MWD	WFA	MVWD	Water-master	SAWPA	CDA	RWQCB
Imported water (WFA)	Imported water from the State Water Project (SWP) purchased from IEUA, a member agency of the Metropolitan Water District of Southern California (MWD). This water is delivered to the Agua de Lejos Regional Water Treatment Facility in Upland and conveyed to the City's system through the 30-inch Ramona Feeder or a new 42-inch transmission main. The water treatment plant and delivery facilities are owned and operated by a joint powers authority called the Water Facilities Authority (WFA). Chino Hills is a member of the WFA.	X	X	X	X				
Imported Water and Groundwater (MVWD)	Groundwater from the Chino Basin extracted by Monte Vista Water District (MVWD) wells and imported water allocated to MVWD, delivered to the City under the terms of a contractual agreement between the City and MVWD. A portion of the City's rights to this water derives from the City's original WFA entitlement, and a portion derives from additional entitlement acquired from MVWD.	X	X		X	X	X		X
Groundwater (City)	Groundwater from the Chino Basin extracted by City-owned wells.	X	X			X	X		X
Desalted Groundwater (CDA)	Desalted groundwater from the Chino Basin through the reverse osmosis (RO) treatment facilities of the Chino Basin Desalter Authority (CDA).	X				X	X	X	X
Recycled water	Recycled water from the IEUA regional recycled water facilities, delivered through a separate recycled water system to meet non-potable uses in the City.	X							X

Figure 4-1

Water Supply Sources

4.1.1 Inland Empire Utilities Agency

Chino Hills is a member agency of the Inland Empire Utilities Agency. The Agency provides imported water to the cities of Chino, Chino Hills, Fontana, Montclair, Ontario and Upland, as well as the Monte Vista Water District, the Jurupa Community Services District, and the Cucamonga Valley Water District. Approximately 700,000 people reside in the Agency's service area.

The Inland Empire Utilities Agency distributes water, provides industrial/municipal wastewater collection and treatment services, and provides other related utility services for the western portion of San Bernardino County. The Agency's service area is located in the southwestern section of San Bernardino County. The 242 square mile service area generally encompasses the Chino Basin, which consists of a relatively flat alluvial valley that slopes from north to south at a one to two percent grade. Valley elevation ranges from about 2,000 feet in the foothills below the San Gabriel Mountains to about 500 feet near Prado Dam.

The principal drainage for the Chino Basin is the Santa Ana River. It flows sixty-nine miles from its origin in the San Bernardino Mountains to the Pacific Ocean. The Santa Ana River enters the Basin at the Riverside Narrows and flows along the southern boundary to the Prado Flood Control Reservoir where it is eventually discharged through the outlet at Prado Dam. Year-round flow occurs along the entire reach of the Santa Ana River due to surface inflows at Riverside Narrows, discharges from municipal water recycling plants to the Santa Ana River, and rising groundwater.

The IEUA (originally the Chino Basin Municipal Water District) was formed by popular vote of its residents in June 1950 to become a member agency of the MWD of Southern California for the purpose of importing supplemental water and augmenting local stream and groundwater supplies. Since its formation in 1950, the Agency has significantly expanded its services. These include production of recycled water, distribution of imported and recycled water supplies, sewage treatment, co-composting of manure and municipal bio-solids, desalinization of groundwater supplies, and disposal of non-reclaimable industrial wastewater and brine.

4.1.2 Metropolitan Water District of Southern California

The IEUA is a member of the MWD of Southern California, the wholesale water agency that provides imported water from Northern California (State Water Project) and the Colorado River to 27 member agencies located in portions of Los Angeles, Orange, Riverside, San Bernardino, San Diego and Ventura Counties. As a water wholesaler, MWD has no retail customers. It distributes treated and untreated water directly to its member agencies. MWD provides an average of 60 percent of the municipal, industrial and agricultural water used within its service area. The remaining 40 percent comes from local wells, local surface water, recycling and from the City of Los Angeles' aqueduct in the eastern Sierra Nevada.

4.1.3 Water Facilities Authority

The Water Facilities Authority (WFA) is a joint powers agency formed for the specific purpose of funding the construction and operation of the Agua de Lejos Regional Water Treatment Facility, more commonly known as the WFA treatment plant. The facility is located in the city of Upland and treats State Project water received through turnout IEUA #12 on MWD's Foothill Feeder Rialto Pipeline. WFA member agencies are the cities of Upland, Ontario, Chino, and Chino Hills, and the Monte Vista Water District. The member agencies are joint owners of the treatment plant. The City of Chino Hills owns 12.72 MGD of capacity (a 15.7 percent share) in the WFA treatment plant.

4.1.4 Monte Vista Water District

The Monte Vista Water District (MVWD) provides retail and wholesale water supply services to a population of over 100,000 within a 30-square mile area, including the communities of Montclair, Chino Hills (by contract), portions of the City of Chino, and the unincorporated area lying between the cities of Pomona, Chino Hills, Chino, and Ontario. Along with the City, MVWD is a member agency of IEUA and a member agency of the WFA.

MVWD overlies a portion of the Chino Groundwater Basin and has developed extensive well capacity to facilitate conjunctive use of the basin. Beginning in 1996, the City of Chino Hills purchased capacity rights from MVWD for a total of 20.22 million gallons per day (MGD). Water delivered under the acquisition agreement is comprised of a combination of imported water through the WFA treatment plant and groundwater produced by MVWD wells. As part of this arrangement, a new 42-inch transmission main was constructed to facilitate delivery of the increased supply to the Chino Hills system. The agreements provide for a needed water supply source for the City, and allow MVWD to expand its demand base for use of its groundwater capacity beyond its own service area.

4.1.5 Santa Ana Watershed Project Authority

The IEUA is a member of the Santa Ana Watershed Project Authority (SAWPA). Formed in 1972, SAWPA is a joint powers agency that coordinates regional planning within the Santa Ana Watershed to address water quality and supply improvements. SAWPA is comprised of the five major water supply and wastewater management agencies within the Santa Ana River Watershed: Inland Empire Utilities Agency, Eastern Municipal Water District, Orange County Water District (OCWD), San Bernardino Valley Municipal Water District and Western Municipal Water District.

Since the early 1970's, SAWPA has played a key role in the development and update of the Regional Basin Plan for the Santa Ana Regional Water Quality Control Board (SARWQCB). SAWPA conducts water-related investigations and planning studies, and builds facilities needed for regional water supply, wastewater treatment or water quality remediation. Current studies include the Chino Basin Water Resources Management Study, the Colton-Riverside Conjunctive

Use Project, an investigation of water quality in Lake Elsinore and studies on the nitrogen and organic carbon levels in the Prado Basin.

4.1.6 Chino Basin Watermaster

IEUA is a member of the Chino Basin Watermaster (Watermaster) Board of Directors. The Watermaster was established in 1978, by a judgment entered by the Superior Court of California. The Judgment required that the Watermaster develop a management plan for the Chino Groundwater Basin that meets water quality and water quantity objectives for the region. The management plan was completed in 1998 and is included in **Appendix E**.

4.1.7 Chino Basin Desalter Authority

The CDA is a joint powers agency formed to achieve sustainable management of water quality in the lower portions of the Chino Basin through the construction of desalter facilities. SAWPA, in cooperation with IEUA, Western MWD, and the OCWD, formed SAWPA Project Committee #14, which initiated the Chino 1 Desalter. This desalter is the first phase of a much larger effort that will eventually desalt an estimated 30,000 AFY of degraded groundwater extracted from the lower Chino Basin. The CDA was subsequently formed by agencies subscribing to capacity in the new desalters. Capacity shareholders are the Cities of Ontario, Chino, and Chino Hills, City of Norco, as well as the Jurupa CSD and the Santa Ana Water Company. The contract operator is the IEUA, and the administrative entity is the Jurupa CSD. The City of Chino Hills currently has subscribed to 1.86 MGD in the existing desalter, and is committed to take a total of 4.0 MGD when the next phase comes on line.

4.1.8 Santa Ana Regional Water Quality Control Board

The Santa Ana Regional Water Quality Control Board (SARWQCB) is responsible for the development and enforcement of water quality objectives to meet the requirements of the Federal Clean Water Act, California Porter-Cologne Act, and the National Pollution Discharge Elimination System (NPDES).

In 1975, the SARWQCB completed the Water Quality Control Plan for the Upper portion of the Santa Ana Watershed. This Plan was updated in 1995. The plan outlined specific water quality management actions to address water quality and salt (total dissolved solids) build up within the Chino Basin. These included the construction of a large well field and desalters in the lower part of the Basin to extract and treat poor quality water; the construction of a pipeline to export brines from the upper Basin to the ocean; and the use of large volumes of low total dissolved solids (TDS) water for groundwater recharge.

A brine line (known as the Santa Ana River Interceptor or SARI line) has been in operation since 1975. In addition, two groundwater desalting plants are in place. The Optimum Basin Management Program (OBMP) by the Chino Basin Watermaster has been developed, in part, to meet the requirements of the 1975 Water Quality Control Plan.

In accordance with the UWMP Act, the City coordinated its water use projections with the IEUA. The City provided estimates of future supply needs, and once IEUA documented supply projections in IEUA's *2005 Urban Water Management Plan*, the City further refined its projections in conjunction with revisions to its *Master Plan*. Current and projected water supplies for the City are presented in **Table 4-2.**

Table 4-2
Current and Projected Water Use (AFY)[1]

Water Supply Sources	2005	2010	2015	2020	2025	2030
Imported Water (WFA)	1,879	1,900	2,400	2,800	3,300	3,300
Imported Water & Groundwater (Monte Vista)[2]	10,346	9,500	9,900	10,200	10,700	10,800
Groundwater (City)	2,477	4,200	4,200	4,200	4,200	4,200
Desalted Water (CDA)	1,250	4,200	4,200	4,200	4,200	4,200
Recycled Water	815	2,900	4,000	4,000	4,000	4,000
Total	**16,800**	**22,700**	**24,700**	**25,400**	**26,400**	**26,500**

[1] 2005 data is based on City records; projections are based on assumptions documented in the *Master Plan.*
[2] In FY 2005, Monte Vista supply included 6,677 AF of imported water and 3,669 AF of groundwater.

The City is supplied imported water from the State Water Project via MWD and IEUA. The City relies on imported water, since its own wells are not sufficient to supply the City's water demands. This imported water, delivered to the City from the WFA treatment plant, is expected to continue to be a vital component of the City's water supply. The reliability of the imported water supply is discussed further in Chapter 5.

4.2 Groundwater

An important source of water for the City of Chino Hills is the Chino Groundwater Basin, a major aquifer system in the Santa Ana River watershed which provides both local yield and seasonal carry-over storage for water purveyors in the region. As discussed previously, the City obtains about half of its water supply from groundwater. The following sections provide more detail about the Chino Basin, water rights, basin management, subsidence issues, and groundwater quality.

4.2.1 Chino Basin

The City of Chino Hills extracts groundwater from the Chino Groundwater Basin using its own wells. The City also relies on water purchased from the Monte Vista Water District. The water provided from the MVWD consists of a mix of groundwater extracted from the Chino Groundwater Basin by MVWD wells and imported water from the WFA treatment plant.

While considered to be a single basin, the Chino Groundwater Basin has been divided into five management zones, based upon similar hydrologic conditions, and into three sub-basins, as defined in the Chino Basin Watermaster Optimum Basin Management Program (OBMP), June 2000, and 1995 Water Quality Control Plan for the Santa Ana Watershed (Region 8) respectively.

The Basin is one of the largest groundwater basins in Southern California, containing about 5,000,000 acre feet (AF) of water in storage, with an additional unused storage capacity of about 1,000,000 AF. Cities and other water supply entities extract Basin groundwater for all or part of their municipal and industrial supplies. In addition, 300 to 400 agricultural users pump from the Chino Basin. The average safe yield of the Basin is approximately 140,000 AFY.

The City's active wells are located within the service area of the neighboring City of Chino, and extracted groundwater is conveyed to the City's lower pressure zone through a system of transmission mains.

Groundwater production from the City's wells has ranged over the past decade from as low as 2,027 AF in 2002-03 to as great as 4,856 AF in 1998-99. This production has generally contributed from 20 to 35 percent of the City's total supply, but in the recent past has been restricted due to subsidence and water quality issues.

4.2.2 Chino Hills Production Rights Entitlement

Operation of the Chino Basin is governed by a 1978 court judgment and agreement among producers, whereby each is allotted a "base water right" to a certain percentage of the natural yield or "safe yield" of the basin. Prior to 1978, the Basin was in an overdraft condition. Under the Judgment, entities can pump in excess of their allotted base right, but must pay a per-acre foot pump tax to cover the cost to replenish any overdraft. The water rights, or production allocations, are divided among three interest groups or "pools:" 1) overlying agricultural, 2) overlying non-agricultural, and 3) appropriative. The provisions of the Judgment and monitoring, replenishment and other obligations are presided over by the court-appointed Watermaster. A copy of the Judgment is provided in **Appendix E**.

Based on provisions of the Judgment, the total water right of the City of Chino Hills to Chino Basin is 4,526 AFY, distributed as shown in **Table 4-3**. The judgment also set aside a large portion of the estimated safe yield for the overlying agricultural pool. As agricultural lands are converted to urban use, a portion of the production right associated with the converted land is transferred to the appropriative pool, and allocated among appropriators in proportion to their initial share.

Table 4-3
City of Chino Hills Water Rights to Chino Basin

Description	Actual 2004 (AFY)
Base Right per Judgment	2,111
Agricultural Conversion (Pool, current)	1,300
Agricultural Conversion (transfer)[1]	1,115
Operating Safe Yield[2]	**4,526**

[1] Under-production by agricultural users (Ag pool - 82,000 - sum of conversion)

[2] Operating safe yield is based on Watermaster assessments 2003 - 2004.

4.2.3 Basin Management

Management of the Chino Basin is a cooperative effort involving several agencies. In 1998, the Chino Basin Watermaster developed an integrated set of water management goals and actions, incorporated in the OBMP, which was updated in 2000. This document describes nine program elements to meet the water quality and local production objectives in the Chino Groundwater Basin. The OBMP encourages the increased use of local supplies to help "drought proof" the Chino Basin.

In July 2000, the Watermaster's planning process culminated with the adoption of a "Peace Agreement" that ended over 15 years of litigation within the Chino Basin. The Peace Agreement outlines the schedule and actions for implementing the OBMP, and clears the way for the OBMP to proceed.

4.2.4 Subsidence Issues

Concerns over observed subsidence in the City of Chino resulted in litigation and a resulting Forbearance Agreement whereby the City of Chino Hills volunteered (with a yearly option to continue or discontinue) to restrict pumping from wells in the subsidence area pending completion of a three-year Subsidence Study, now in its final year. This study, under the direction of the Watermaster, includes conducting deep well tests to investigate the elasticity of the aquifer system and to ascertain the impact of certain wells. During the period that Chino Hills groundwater production is restricted, the Watermaster compensates the City for the difference in cost to purchase an equivalent quantity (about 1,500 AF), up to its operational safe yield, of imported water through the WFA treatment plant. The Forbearance Agreement and Subsidence Study was extended for a fourth year to better define aquifer responses.

4.2.5 Water Quality Issues

Water quality in much of the Chino Basin is excellent, with all constituents which are required to be monitored being below the maximum contaminant levels (MCLs) for drinking water established by the State of California Department of Health Services (DHS). However, the City's wells are in Management Zone No. 1, which includes the western fringe of the Basin and which has several significant water quality issues.

Nitrate and arsenic levels within specific areas exceed MCL standards. With the arsenic MCL recently lowered to 10 parts per billion (ppb), several of the City's wells require blending or treatment to meet the new standards. The date by which systems must be in compliance with the new standards is January 1, 2006. Another concern is the migration of contaminants due to shifting pumping patterns and gradients, making it difficult to predict future water quality at a given location. Some constituent concentrations vary with depth. Nitrates are generally exhibited in the shallower formations, while arsenic is found at greater depths.

Based on data from the Watermaster's quality monitoring program, it appears that groundwater is of better quality in the areas to the east and north of the City's existing wells (east of Euclid and north of SR-60). For this reason, as well as the greater potential for favorable pumping conditions in these areas, the *Master Plan* recommends that new extraction wells by the City should be placed in these areas if possible.

4.2.6 Well Production

Because of the water quality and subsidence issues described in the preceding sections, the City's wells have not been operating at full capacity, and the City has withdrawn less than its capacity right. Following is a summary of the City's groundwater withdrawals, including groundwater received from Monte Vista Water District, over the last five years.

Table 4-4
Groundwater Production 2000-2005 (AFY)

Chino Basin Withdrawal Source	2000	2001	2002	2003	2004
City Wells[1]	4,239	3,605	2,027	2,416	2,477
Monte Vista Wells[2]	No data	No data	No data	No data	3,669
Total	4,239	3,605	2,027	2,416	6,146

[1] Data is based on City records for each FY from 2000 to 2005.

[2] No data is available on the breakdown between groundwater and imported water supplied by the Monte Vista Water District for years 2000 through 2003. Note, groundwater extracted from Monte Vista Water District wells is not allocated to the City's water

4.3 Recycled Water

The City of Chino Hills uses recycled water provided by IEUA from the Carbon Canyon Wastewater Reclamation Facility (CCWRF). IEUA (formerly the Chino Basin Municipal Water District) operates as a wholesale deliverer of Title 22 recycled water to local water purveyors throughout the Chino Basin. IEUA has developed recycled water supply as part of a comprehensive plan to manage water resources in the Chino Basin. Both the Regional Water Quality Control Board (RWQCB) and the State of California DHS govern recycled water use. Recycled water from all the IEUA recycled water treatment facilities meets the Title 22 requirements for non-restricted recreational use (full body contact).

Water recycling is a critical component of IEUA's water resources management strategy for the region. Reuse of highly treated tertiary water is the only new source of water available to meet the service area's growing water demand. Recycled water will provide a more dependable local supply of water, and will reduce the likelihood of water rationing during droughts. In addition, use of recycled water for groundwater recharge is an integral part of the Chino Basin Peace Agreement.

4.3.1 Recycled Water Facilities

The IEUA operates four operational regional wastewater treatment plants, including (1) Regional Plant No. 1, (2) CCWRF, (3) Regional Treatment Plant No. 4, and (4) Regional Plant No. 5. All of IEUA's wastewater treatment plants produce water that meets or exceeds the requirements of the State of California DHS Title 22 standards for recycled water.

The City is predominantly served from the CCWRF, which is located along Telephone Avenue in the City of Chino. The Carbon Canyon Wastewater Reclamation Facility's distribution system delivers water through 21,400 linear feet of pipelines to the cities of Chino and Chino Hills. The CCWRF has been operational since 1992 and currently treats 8 MGD for irrigation and agricultural use. Recycled water produced at the CCWRF enters the City's recycled water system from Chino Hills Parkway.

The new 15-MGD Reclamation Plant No. 5 is located on Kimball Avenue, east of El Prado Avenue in City of Chino, and will supply recycled water to the City of Chino Hills.

The City's existing recycled water system lies in the southeastern portions of the City. The system layout is typical of most recycled water systems – a relatively simple transmission system layout aimed at new development areas and large water usage customers (such as golf courses and large parks). A system of pump stations, pipelines and reservoirs are proposed to deliver recycled water to multiple pressure zones throughout the City.

4.3.2 Existing and Potential Recycled Water Demand

Recycled water deliveries to City customers began in September 1999. Approximately 42 AF were supplied that year. The demands have steadily increased since the system's inception – reaching 815 AFY of demand in 2005. Based on the *Master Plan*, recycled water currently accounts for approximately six percent of the total water used in the City.

The recycled water usage is primarily landscape irrigation - such as golf courses, parks, and landscaped medians. The Big League Dreams Park, a Little League sports park, is the second largest recycled water user, using approximately 75 AF of water in 2003. Los Serranos Golf Course is the largest user of recycled water in the City's system; Los Serranos Golf Course used 620 AF of water in 2003-04.

Future recycled water demands are expected to grow within Chino Hills. Based on the *Master Plan*, continued demand growth is constrained by the limited recycled water infrastructure available to serve customers. Future recycled water demands are estimated by considering existing customers, future customers (new proposed developments), and conversion customers.

Opportunities to expand the recycled water system include (1) new developments along the Soquel Canyon corridor, including a new golf course; and (2) conversion of existing potable water customers such as Western Hills Golf Course, Ayala High School, and Boys Republic. The City is currently studying the recycled water system as part of its *Master Plan*, to better quantify and target new recycled water customers.

The *Master Plan* projects recycled water demands to be approximately 4,000 AFY at build-out in 2020. The City is expanding its recycled water system to serve the major non-potable users in three pressure zones. **Table 4-5** presents the approximate recycled water use for 2005, as well as the projected recycled water use for 2010 through 2030. Projected recycled water use for 2005 was not clearly provided in the 2000 UWMP, so a comparison of actual versus projected recycled water use is not available.

Table 4-5
Current and Projected Recycled Water Use (AFY)

Recycled Water Usage	2005	2010	2015	2020	2025
Landscaping	815	2,900	4,000	4,000	4,000

Note: Projections are based on the assumptions documented in the 2005 *Master Plan*.

4.3.3 Optimizing the Use of Recycled Water

The City is working closely with IEUA to expand its use of recycled water. The IEUA has assured the City that adequate recycled water will be available when needed and is actively promoting the use of this resource in the City and elsewhere in its service area.

In February 1998, the City of Chino Hills enacted Ordinance No. 101, adding to Chapter 15.08, "Regulations for the Availability and Use of Reclaimed Water," of the Chino Hills Municipal Code. On May 3, 2000, IEUA adopted Ordinance No. 69. The Ordinance redefines the agency's recycled water program and establishes new wholesale rates. The City's current retail recycled water rate is $291 per acre-foot, which is to 80 percent of the City's $364 per acre-foot potable water cost.

Based on the IEUA's *2005 Urban Water Management Plan*, IEUA is working closely with its local retail agencies, including Chino Hills, to develop a regional recycled water distribution program to maximize water reuse. Currently, the IEUA is implementing the following measures to encourage recycled water use:

- Discount rate for recycled water
- Requirements for dual plumbing for new developments (working with local agencies to implement by 2015)
- Marketing program for recycled water (working with local agencies to implement)

The following incentives are proposed:

- Shared costs for service connections, water meters, and signage
- Loans to help finance local infrastructure and retrofit projects that contribute to use of recycled water
- Technical assistance with engineering, regulatory, and institutional issues and with the preparation of funding applications
- Guarantee of recycled water supply reliability during droughts

Recycled water use incentives and optimization of use are documented in further detail in IEUA's *2005 Recycled Water Implementation Plan*. However, the City is not able to quantify the projected results of these actions in terms of volume increases in recycled water use.

4.4 Transfer and Exchange Opportunities

As described in Section 4.2, the City has an agreement with the Monte Vista Water District to receive up to 20.22 MGD. Interconnections with the City of Chino and Pomona may also be considered to improve reliability during a temporary disruption in imported water supply. The Chino Basin may also be a future resource for water transfers because of its storage capacity of up to 1 million AF.

4.5 Development of Desalinated Water

Desalted groundwater from Chino Groundwater Basin is produced by treatment through the reverse osmosis (RO) treatment facilities of the CDA. The CDA water source is described in Section 4.1.7. No additional desalinated water supply projects are planned.

4.6 Potential Projects to Increase Water Supply

Although the City's supply sources appear to be more than adequate to meet projected ultimate demands, the potential for prolonged disruptions of the imported supply has prompted the City to embark on a program to increase the redundancy of its sources. Based on the *Master Plan*, the strategy to improve water supply is to increase and improve the reliance of the City's wells, to purchase CDA capacity, and to expand the recycled water system. Because of the uncertainties associated with MVWD's ability to deliver the full contract amount during an outage of the importation system the City is undertaking measures to assure its ability to meet maximum month demands under all reasonable contingencies, primarily by effecting a shift away from heavy reliance on the importation system. Several recommendations are made to improve the City's supply reliability, including the following:

- Expand recycled water system and usage
- Market surplus importation capacity
- Increase groundwater capacity and transmission system reliability
- Meet maximum month requirements with importation system outage
- Pursue regional solutions, including inter-ties with adjacent entities

The City has developed a long range Capital Improvement Program which includes time-phased measures to expand supply opportunities, as documented in the *Master Plan*.

Chapter 5
Water Supply Reliability

5.1 Reliability of Imported Water Supply

MWD's primary goal is to provide reliable water supplies to meet the water needs of its service area at the lowest possible cost. In the past, the delivery of water to the MWD's member agencies has been nearly 100 percent reliable. However, as existing imported water supplies from the Colorado River and State Water Project face increasing challenges, the assured reliability of deliveries from these sources has diminished.

To address these challenges, MWD has expanded its development of water transfers and of water storage and banking projects. Also, working with its member agencies, MWD has expanded the development of local and alternative water supplies and the implementation of water conservation programs. MWD's measures and plans to provide reliable water supply are documented in its *March 2003 Report on Metropolitan's Water Supplies – A Blueprint for Water Supply Reliability* (MWD, 2003). That report projects that in cooperation with its member agencies, MWD will be able to meet 100 percent of retail water demands during average, dry, and multiple-dry-year scenarios over the next 20 years. During catastrophic shortages, MWD will redirect as necessary the limited imported water to member agencies which are largely dependent on imported water (i.e., those without major groundwater resources).

The IEUA has recognized in its *2005 Urban Water Management Plan* that supply reliability is a high priority for the region, which is experiencing explosive growth. The IEUA expects to meet 100 percent of its dry year demand under every scenario. **Table 5-1** presents the supply reliability (percent of normal supply) that IEUA expects to provide to the region.

Table 5-1
IEUA Supply Reliability (% of Normal Supply)

Source[1]	Single Dry Year	Multiple Dry Water Years		
		Year 1	Year 2	Year 3
Imported Water	68%	68%	68%	68%
Groundwater	115%	115%	115%	115%
Recycled Water	100%	100%	105%	110%

[1] The data in this table is based on the IEUA 2005 UWMP.

Based on IEUA's *2005 Urban Water Management Plan*, IEUA has assumed that groundwater may be pumped in excess of the safe yield during dry years. IEUA has also projected that the production of recycled water will gradually increase as more customers become connected to the recycled water system. During multiple dry years, the overall source scenario for the IEUA service area indicates that even during prolonged droughts there is a vast quantity of water stored in the Chino Basin. Local agencies must reduce their imported water demands by increasing groundwater production. This table is included for comparison purposes, but may not be directly applicable to Chino Hills.

5.2 Reliability of Groundwater Supply

City Groundwater: The City's groundwater supply is generally very reliable. However, some existing wells are not currently in use because of the subsidence investigation discussed in Section 4.3.4. Also, as discussed in Section 4.5.2, water quality issues can limit supply. The City is currently exploring and planning to implement various alternatives such as adding treatment processes to existing wells and constructing a new well field to improve the City's groundwater supply reliability, as discussed in the *Master Plan*.

CDA Groundwater: It is assumed that the water supplied by the CDA will be a reliable supply, available on a constant flow basis throughout the year, although it is possible that the supply wells or RO membrane treatment facilities could be subject to short-term outages. The CDA allows for 96 percent run-time and 4 percent down-time for filter and maintenance issues.

5.3 MVWD Imported Water and Groundwater Supply

With over half of the City's ultimate potable requirements slated to be provided through the MVWD capacity acquisition, it is important that the City have confidence that the MVWD can indeed deliver the contracted supply even under adverse circumstances. The City has a substantial investment in MVWD capacity, and it has been counted as a firm source in the DHS compliance documentation and SB 610/221 Water Supply Assessment and Verification reporting. The MVWD sources (WFA imported water and Chino Basin groundwater), are subject to the same or similar potential disruptions as the City's principal sources. In particular, the imported source for both entities has the same origin and relies on common conveyance and treatment facilities.

Based on the *Master Plan*, the MVWD's expanded source capacity, upon completion of planned improvements, appears to be adequate to meet its own ultimate demands as well as the Chino Hills obligation. However, in the event that imported water deliveries are curtailed, the MVWD sources would also deliver less water, even if all wells are operating at full capacity. MVWD wells are subject to similar water quality challenges as those operated by Chino Hills, as discussed further in Section 5.5.2.

5.4 Recycled Water Reliability

Both IEUA and the City are committed to providing safe and reliable recycled water to its customers. Water recycling is a critical component of IEUA's water resources management strategy for the region, because it is recognized as a very reliable water source during times of drought or other water supply shortage condition.

Recycled water receives extensive treatment and testing based on stringent State and Federal regulations; water quality impacts on reliability are discussed in more detail in Section 5.5.3.

5.5 Water Quality Impacts on Reliability

Water quality of each water supply source must be considered in assessing the reliability of that water source. The following sections discuss the water quality impacts on reliability for each type of Chino Hills' water supply sources – imported water, groundwater, and recycled water.

5.5.1 Imported Water Quality

The imported water supplied by the IEUA is conveyed by the Metropolitan Water District from the northern Sierras via the Bay-Delta (State Water Project). State Water Project water is relatively low in salinity, but typically contains high levels of bromide and total organic carbon, most likely due to seawater intrusion and agricultural drainage from peat soil islands in the Bay-Delta, the confluence of the San Francisco Bay, Sacramento River, and San Joaquin River. Bromide and total organic carbon combine with chemicals used in the water treatment process to form disinfection by-products that are strictly regulated under the federal Safe Drinking Water Act. Imported water is treated at the WFA treatment plant; water quality monitoring at the plant and plant upgrades ensure continued water quality. The City does not expect imported water quality to affect supply reliability.

5.5.2 Groundwater Quality

As documented in Chapter 4 and in IEUA's *2005 Urban Water Management Plan*, the Chino Basin management efforts have emphasized the importance of water quality to ensure long-term groundwater use in the region. In 1989, the Chino Basin Watermaster initiated a regular monitoring program for the Chino Basin.

The quality of the groundwater in the northern and central portions of the Chino Basin is generally good and in most areas meets the California DHSs' Safe Drinking Water Standards. However, the quality of groundwater in the southern portion of the basin becomes increasingly poor, with very high TDS and nitrate concentrations resulting from past and continuous agricultural and other activities overlying the southern half of the basin. The City's wells are in Management Zone No. 1, which includes the western fringe of the Basin and which has several significant water quality issues.

As previously discussed, nitrate and arsenic levels within specific areas exceed MCL standards. With the arsenic MCL recently lowered to 10 ppb, several of the City's wells require blending or treatment to meet the new standard. The date by which systems must be in compliance with the new standards is January 1, 2006. Another concern is the migration of contaminants due to shifting pumping patterns and gradients, making it difficult to predict future water quality at a given location. Some constituent concentrations vary with depth. Nitrates are generally exhibited in the shallower formations, while arsenic is found at greater depths. Based on data from the Watermaster's quality monitoring program, it appears that groundwater is of better quality in the areas to the east and north of the City's existing wells (east of Euclid and north of SR-60). For this reason, as well as the greater potential for favorable pumping conditions in these areas, the

Master Plan recommends that new extraction wells by the City should be placed in these areas if possible. The City's Capital Improvement Program includes hydrogeologic and site studies to find favorable locations for new wells.

The SARWQCB and the Chino Basin Watermaster have developed water quality standards and management programs that will lead to the mitigation and management of the water quality issues in the Chino Groundwater Basin. Treatment processes, including the construction of desalters and the removal of agricultural and industrial waste and brine are a costly but essential part of the overall strategy to ensure maximum use of groundwater supplies.

5.5.3 Recycled Water Quality

Both IEUA and the City are committed to providing safe and reliable recycled water to their customers. Recycled water receives extensive treatment and testing based on stringent State and Federal regulations. Recycled water treatment standards can vary depending on the application, but for most applications in the State of California, recycled water is treated to Title 22 Standards. Title 22 standards allow humans full body contact with recycled water, but not potable consumption. There is considerable interest in the area of emerging contaminates, water quality testing, and the issues of health, safety and risk regarding all water supplies. For this study, recycled water uses planned are restricted to non-potable uses, such as those allowed under Title 22.

Total Dissolved Solids (TDS) is commonly used as a water quality parameter for recycled water. Based on IEUA's *2005 Urban Water Management Plan*, IEUA's recycled water supply TDS has ranged from 373 to 550 milligrams per liter (mg/L). The CCWRF had TDS levels ranging from 408 to 504 mg/L from July 2000 to June 2001. The City can expect the TDS values at the higher IEUA range due to the City's location in the southern part of the IEUA system. The basin limit is 550 mg/L, and therefore it is reasonable to assume that the supply would remain at or below that level. Even at the higher TDS range, the IEUA recycled water quality is considered very good.

Recycled water holds the greatest potential as a new source of supply in the region but it also requires the highest level of treatment to meet water quality use requirements. The TDS and nitrogen concentrations in recycled water can exceed the basin management objectives set by SARWQCB and the Chino Basin Watermaster. Additional actions may be needed to make full use of recycled water including contributing to a salt offset program (such as through the construction of desalters) and the blending of recycled water with other lower TDS sources.

5.6 Current and Projected Normal Year Supply and Demand

Based on the analyses provided in the City's *Master Plan*, there is sufficient water supply to meet projected demands through 2030. **Table 5-2** provides current and projected normal year supply and demand for the City.

Table 5-2
Current and Projected Normal Year Supply and Demand (AFY)

	2005	2010	2015	2020	2025	2030
Demand	16,800	22,700	24,700	25,400	26,400	26,500
Supply						
Imported Water (WFA)	1,879	1,900	2,400	2,800	3,300	3,300
Imported Water & Groundwater (Monte Vista)	10,346	9,500	9,900	10,200	10,700	10,800
Groundwater (City)	2,477	4,200	4,200	4,200	4,200	4,200
Desalted Water (CDA)	1,250	4,200	4,200	4,200	4,200	4,200
Recycled Water	815	2,900	4,000	4,000	4,000	4,000
SUBTOTAL	16,800	22,700	24,700	25,400	26,400	26,500
Difference (Supply-Demand)	**0**	**0**	**0**	**0**	**0**	**0**

[1] Projections are based on assumptions documented in the City's 2005 *Master Plan*.

5.7 Dry Year and Multiple Dry Year Supply and Demand

The City benefits from its diversified water supply during a dry year. **Table 5-3** presents a supply and demand comparison for a single dry year, 2005, and multiple dry years, 2006 through 2008. In this table, demand projections in multiple dry years are assumed to increase due to dry year climatological conditions and population growth, but with a partially off-setting decrease due to implementation of the City's Conservation/Rationing Plan.

The single dry year analysis herein assumes a single dry year will result in a 5 percent increase in demand, with no conservation. It assumes there will be a 10 percent increase in imported water supplies from WFA and Monte Vista Water District, Monte Vista Water District groundwater supply, and CDA supply. There will be no change in recycled water or City groundwater supplies.

The multiple dry year analysis assumes demand will increase based on forecasted demand increases, but will also incorporate a 10 percent reduction due to conservation. Multiple dry year supplies assume a 20 percent increase in imported water supplies from WFA and Monte Vista Water District, Monte vista groundwater supply, and CDA supply. In 2008, the Dry Year Yield (DYY) program will be implemented.

Table 5-3
Dry Year and Multiple Dry Year Supply and Demand (2005-2008)

	Normal Year (2005)	Single Dry[1] (2005)	Multiple Dry Water Years (AFY)[2]		
			2006	2007	2008
Demand	16,767	17,600	16,900	18,000	19,000
Supply					
Imported Water (WFA)	1,879	2,067	2,255	2,255	807
Imported Water & Groundwater (Monte Vista)[3]	10,346	11,381	12,415	12,415	12,415
Groundwater (City)	2,477	2,477	2,477	2,477	3,925
Desalted Water (CDA)	1,250	1,375	1,500	1,500	1,500
Recycled Water	815	815	815	815	815
SUBTOTAL	16,767	18,100	19,500	19,500	19,500
Difference (Supply-Demand)	**0**	**500**	**2,600**	**1,500**	**500**

[1] The single dry year assumes a 5% increase in demand. The single dry year assumes a 10% increase in imported water supplies from both WFA and Monte Vista Water District, Monte Vista groundwater supply, and CDA supply.

[2] Demand for multiple dry years is increased based on increased forecasted demand, but assumes a 10% decrease due to conservation. Multiple dry year supplies assume a 20% increase in imported water supplies from both WFA and Monte Vista Water District, M

[3] The water supplied by MVWD is comprised of both imported water and groundwater. For the purpose of this table, it is assumed that half of MVWD supply is from imported water and half is from groundwater.

The DYY Program is a conjunctive use project consisting of infrastructure improvements at water agency facilities throughout the Chino Basin, designed to enable MWD's dry year storage of up to 100,000 AF of surplus imported water in Chino Basin. The $28.5 million project includes well treatment facilities, new wells, and conveyance pipeline improvements. With the implementation of the DYY Program, in a dry year MWD can request Chino Basin water agencies to pump additional groundwater for up to three years instead of taking full service imported water. The City of Chino Hills has agreed to reduce imported water service by 1,448 AFY and supplement with groundwater in a dry year. The DYY Program is scheduled to become effective in 2008.

The dry year and multiple dry year scenarios are expected to change by 2010 as the recycled water system is expanded, the CDA facilities are expanded, and City wells are functioning at normal capacity. Table 5-4 presents a supply and demand comparison for a future single dry year, 2010, and multiple dry years, 2011 through 2013.

Table 5-4
Dry Year and Multiple Dry Year Supply and Demand (2010-2013)

	Normal Year (2010)	Single Dry[1] (2010)	Multiple Dry Water Years (AFY)[2]		
			2011	2012	2013
Demand	22,700	23,800	21,800	23,500	24,600
Supply					
Imported Water (WFA)	1,900	452	452	452	452
Imported Water & Groundwater (Monte Vista)[3]	9,500	10,450	11,400	11,400	11,400
Groundwater (City)	4,200	5,648	5,648	5,648	5,648
Desalted Water (CDA)	4,200	4,620	5,040	5,040	5,040
Recycled Water	2,900	2,900	2,900	2,900	2,900
SUBTOTAL	22,700	24,100	25,400	25,400	25,400
Difference (Supply-Demand)	**0**	**300**	**3,600**	**1,900**	**800**

[1] The single dry year assumes a 5% increase in demand. The single dry year assumes a reduction in WFA imported water supplies by 1,448 AF and an increase in City groundwater supplies by 1,448 AF per the DYY agreement with IEUA; CDA supply and Monte Vista

[2] Demand for multiple dry years is increased based on increased forecasted demand, but assumes a 10% decrease due to conservation. Multiple dry year supplies assume WFA imported water is decreased and City groundwater is increased by 1,448 AF. Also, it

[3] The water supplied by MVWD is comprised of both imported water and groundwater. For the purpose of this table, it is assumed that half of MVWD supply is from imported water and half is from groundwater.

Chapter 6
Water Shortage Contingency Plan

Chino Hills recognizes that it is important to publicize a water shortage alert promptly, so that the necessary rationing programs and policies can be implemented and public participation will be maximized, thereby reducing the likelihood of more severe shortage levels later.

6.1 Water Quality Operational Plan

The City has developed procedures to respond to various types of emergencies, including water quality problems or water shortage, as part of its Water Quality Operational Plan. This section presents the main emergency response components of the plan.

6.1.1 Emergency Notification Plan

The City's Water Department Director and/or the designee is responsible for implementing the Emergency Notification Plan upon the request of the State of California, Department of Health Services, Office of Drinking Water.

a. All necessary personnel will be on 24-hour emergency call. Staff has been instructed on a door-to-door notification program. As soon as the emergency is evaluated, notification time will be immediate.

b. The City on-call list is updated every two months with a change in personnel on a rotating basis. The person on-call will be responsible to notify the designated person for implementation of the plan.

c. In a magnitude earthquake of 4.0 or greater, the WFA and City together, with all member agencies, are to send an employee in a vehicle with a two-way radio and hand-held two-way radio to the Agua de Lejos Water Treatment Plant following the City's Ramona Pipeline to the Monte Vista Water District system. En route, the City employee is to make a quick damage assessment of the line. On arrival to the plant, he or she is to report findings to the Plant Manager or designated representative and establish radio communications with the City of Chino Hills. He or she is to assist WFA Plant staff until released by the Plant Manager or designated representative.

d. Only upon request y the Department of Health Services, Office of Drinking Water, will the City contact the newspaper, radio stations, and/or television stations in the affected areas. All verbal notifications will be issued in both English and Spanish.

The Water Quality Operational Plan includes guidelines for personnel implementing emergency notification. Guidelines include examples of water quality issues that would require immediate attention by designated staff, and instructions on how to respond to vandalism of a reservoir which exposes the interior.

6.1.2 Vulnerability Assessment

As a result of the Public Health Security and Bioterrorism Response Act of 2002 (Act), the City performed a vulnerability assessment to evaluate the water system's ability to provide a safe and reliable source of drinking water, and the City incorporated the findings into the City's emergency response plan. The vulnerability assessment included evaluations of contamination threats, due diligence procedures to improve security, water quality monitoring, threat management, and public health response/remediation and recovery.

6.2 Water Shortage Contingency Ordinance

In 1996, the City adopted Ordinance No. 83, pertaining to conservation of water and regulating the use of water under shortage conditions. A copy of this ordinance is provided in **Appendix G**. The water use restriction program is based on water shortage stages, and includes financial penalties and the possibility of service interruptions for those customers who exceed their allotment. The water use restrictions to be undertaken in the event of a water shortage include irrigation and washing restrictions, elimination of runoff and leakage, and swimming pool filling restrictions.

6.2.1 Water Shortage and Restriction Stages

Chino Hills developed a four-stage Water Conservation/Rationing Plan to invoke during declared water shortages. Table 6-1 provides a summary of when each of these water conservation stages is implemented. The restrictions associated with each stage are described below; also refer to **Appendix G**.

Table 6-1
Water Shortage and Restriction Stages

Water Shortage Stage	Implementation Condition
Voluntary	Perpetual
Moderate	Reduction in Chino Hills total water storage capacity by 20 to 25% and not replenished within 48 hours
High	Reduction in Chino Hills total water storage capacity to 25 to 30% and not replenished within 48 hours
Severe	Major earthquake, large scale fire, or other major catastrophe; or reduction in Chino Hills storage capacity by more than 30% for any duration

1. **Voluntary Conservation** – Limit water used from June 1 through September 30 each year.

2. **Moderate Water Conservation Alert** – Prohibitions and restrictions include the following:

- No hose washing
- No operation of fountains circulating potable water (reclaimed only)
- No water leakage permitted (repairs to be completed within 72 hours of notification)
- No sprinkling between 9 am and 4 pm; no excess irrigation watering
- Limited private vehicle washing use of water from bucket and hand-held hose
- No drinking water served in restaurants unless requested
- No runoff or leaks due to incorrect use of irrigation system
- Use of fire hydrants for fire fighting and construction only

3. **High Water Conservation Alert** – Prohibitions and restrictions include the following:
   - All prohibitions and restrictions applicable in a Moderate Water Conservation Alert
   - Limited irrigation by water dependent industries (such as commercial nurseries and golf courses) to every other day and between 6 pm and 6 am
   - Limited irrigation and filling of swimming pools by all non-water-dependent industries to two days per week
   - No swimming pool refilling or new construction

4. **Severe Water Conservation Alert** – Prohibitions and restrictions include the following:
   - All prohibitions and restrictions applicable in a Moderate and High Water Conservation Alert
   - Outdoor water use limited to minimal amount using hand-held hose and shut-off nozzle for all water users, including water-dependent industries
   - No non-essential water uses, including filling or filtering swimming pools or fountains

6.2.2 Excessive Use Penalties

Any person, firm, or corporation violating the water use restriction ordinance (Ordinance No. 83 provided in **Appendix G**) will be guilty of an infraction or misdemeanor, and each day of the violation is considered to be a new and separate offense. As such, the penalty structure is as follows:

- First Offense (Infraction) - $25 to $50 fine
- Second Offense (Infraction) - $50 to $100 fine
- Third Offense (Misdemeanor) - $500 to $1,000 fine

In addition, the City may file an action for civil abatement and, at the discretion of the court, be entitled to reimbursement for all necessary costs incurred by the City pertaining to the violation.

6.3 Revenue and Expenditure Impacts

A portion of the surplus revenues that the City collects is currently used to fund the General Reserves and Other Reserves. Based on the FY 2005-2006 Budget, the City has estimated revenue impacts during each shortage stage (Moderate, High, and Severe) by reducing both water sales (revenue) and water purchase costs (expenses) for each shortage stage. The assumptions used, as well as the estimates of these revenue impacts are provided in **Table 6-2**.

Table 6-2
Water Shortage Revenue Impacts

	FY 2006 Budget	Revenue Impacts		
		Moderate Shortage	High Shortage	Severe Shortage
Water Purchase Expense				
Groundwater	$2,189,153	$1,751,322	$1,532,407	$1,094,577
Imported Water from IEUA/WFA	$3,156,766	$2,525,413	$2,209,736	$1,578,383
Recycled Water	$96,000	$96,000	$96,000	$96,000
SUBTOTAL	$5,441,919	$4,372,735	$3,838,143	$2,768,960
Water Sales Revenue	$14,604,900	$11,683,920	$10,223,430	$9,493,185
Total Revenue Impact (Expense)		**$1,851,796**	**$2,777,694**	**$2,438,756**

[1] Moderate water shortage assumes a 20 percent reduction in both groundwater and imported water supplies as well as water sales revenue.

[2] High water shortage assumes a 30 percent reduction in both groundwater and imported water supplies, as well as water sales revenue.

[3] Severe water shortage assumes an 50 percent reduction in both groundwater and imported water supplies, as well as water sales revenue.

Based on the FY 2005-2006 Budget, The General Reserves for Chino Hills are approximately $1.8 million, and Other Reserves are approximately $8.7 million. These reserves are sufficient to cover revenue impacts associated with a water shortage classified as Severe.

6.4 Mechanisms to Determine Water Use Reduction

Water supply to Chino Hills is metered and accounted at each supply source. During a water shortage, the City Manager will be responsible for confirming that the supply quantities being delivered to the City have been reduced in accordance with the shortage contingency plan.

Individual users or classes of users can be monitored in the City's system, to assess their rates of consumption in comparison with the "normal" unrestricted use rates (based on historical consumption) on a seasonal basis. In the event that supply source records indicate that water use reduction targets are not being met, the City would then review water use records for user categories to determine which are not in compliance. The next step would be review of individual use records to identify specific meters and users who have not achieved the appropriate reduction. These users would be contacted and given the incentive to comply.

Appendix A

California Urban Water Management Plan Act

Appendix B

City's Department of Water Resources UWMP Checklist

Appendix C

Public Participation and Public Hearing Notification

Appendix D

2005 UWMP Resolution

Appendix E

Chino Groundwater Basin Documents

Appendix E - Chino Groundwater Basin Documents (Provided on CD)

1. Judgment (Adjudication of Water Rights to Chino Basin), January 1978

2. Implementation Plan – Optimum Basin Management Program for the Chino Basin, June 2000

3. Peace Agreement for Chino Basin, June 2000

Appendix F

MVWD Supply Agreement

Appendix G

Water Conservation Resolutions and Ordinances

Appendix G – Water Conservation Resolutions and Ordinances

1. Resolution No. 95R-59, Single Family Residential Water Survey, 1995
2. Resolution No. 96R-52, Voluntary Water Use Reduction, 1996
3. Ordinance No. 83, Water Conservation, 1996
4. Resolution No. 03R-33, Water Charges – Amendment to Resolution No. 01R-109, 2003